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TESTING A PMTCT INFANT-FEEDING COUNSELING PROGRAM IN TANZANIA

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ABBREVIATIONS

AFASS	Acceptable, feasible, affordable, sustainable, and safe
BF	Breastfeeding
CDC	Centers for Disease Control and Prevention
EBF	Exclusive breastfeeding/exclusively breastfeed
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
IFM	Infant-feeding method
IPC/C	Interpersonal communication and counseling
KCMC	Kilimanjaro Christian Medical Centre
MoH	Ministry of Health
MTCT	Mother-to-child transmission of AIDS
NACP	National AIDS Control Programme
PEPFAR	President's Emergency Program for AIDS Relief
PMTCT	Prevention of mother-to-child transmission of HIV
Q&A	Question and answer
QAP	Quality Assurance Project
RF	Replacement feeding/replacement feed
UNAIDS	United Nations Joint Programme on HIV/AIDS
UNICEF	United Nations Children's Fund
URC	University Research Co., LLC
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

> *When I tell [friends] that the babies can breastfeed for six months without any other foods or fluids, they say it is not possible because the babies will not grow well. Because they don't believe what I'm telling them, I usually give them the brochure to read for themselves.* (HIV-negative breastfeeding mother)

> *Some of my friends when they come to visit have commented [on the breastfeeding brochure] that the information should be given to all mothers who are still breastfeeding because most of the mothers were previously advised to only breastfeed for 2 to 3 months.* (HIV-positive breastfeeding mother)

> *My husband always reads it [the breastfeeding brochure] and reminds me of what I should do if I do anything different. Also, when they visit me, my friends ask where did I get it so that they go for their own copy. They like the colors and the content.* (HIV-positive breastfeeding mother)

This report describes the second phase of a study that developed and tested an integrated program of counselor job aids, mother take-home materials, and counselor training in a healthcare site providing counseling for the prevention of mother-to-child transmission of HIV (PMTCT) in Moshi District in the Kilimanjaro Region of Tanzania. Conducted locally, the participatory formative research used in phase one and described in an earlier publication uncovered substantial weaknesses in the counseling of mothers and provided the practical, detailed information needed to develop the intervention. The overall objective was to produce a cost-effective, culturally sensitive, and technologically appropriate program to improve the quality of infant-feeding counseling. A further objective was to strengthen HIV-positive mothers' ability to make an informed choice and then safely practice a feeding method appropriate for their personal situations.

The counseling and take-home materials were based squarely on the World Health Organization (WHO) guidelines for infant feeding and on a number of WHO and UNICEF generic counseling tools. They were designed to be used with both HIV-positive and HIV-negative women, following HIV screening at Tanzanian PMTCT clinics. The innovative one-day counselor training focused on a technical update, improving interpersonal communication, and promoting the effective use of the counseling materials. The steps used to develop and test the program included: 1) initial coordination meetings with national PMTCT stakeholders to explore interests and build consensus; 2) collection and review of existing materials, related infant-feeding studies, and results of the formative research; 3) rapid development of a draft integrated set of culturally sensitive counseling tools based on existing WHO and UNICEF generic materials; 4) submission of draft materials to both national and international technical experts for review; 5) field testing of draft materials using focus groups and observations of simulated counseling sessions; 6) incorporation of feedback into the final products; and 7) testing of the materials and related training with health workers (focus groups and observations) and participating mothers (in-depth interviews and observations).

This program was implemented at the pilot site and then evaluated relative to two comparison PMTCT pilot sites where it was not implemented. The evaluation completed in-depth home interviews about a month after delivery with 30 mothers from the intervention site (20 HIV-positive and 10 HIV-negative) and about nine months after delivery with 29 mothers from the comparison site (19 HIV-positive and 10 HIV-negative). Second home interviews were held with 13 intervention site mothers and seven comparison site mothers. The home interviews solicited mothers' knowledge and beliefs about HIV and infant feeding, intended infant-feeding practices, problems experienced with infant feeding, the nature of the infant-feeding counseling they received, and feedback from the intervention mothers on the counseling and take-home materials. Direct home observations were also made with use of a checklist

during each interview to identify contradictions between what the mothers reported and practices seen in the home. Simulated counseling sessions with counselors before and after training documented changes in counseling skills. Focus group discussions with counselors elicited their experiences in counseling on HIV and infant feeding and their recommendations for improving the orientation training and support materials.

The study found that the integrated program: 1) was easy to implement, 2) was highly regarded by counselors and mothers, 3) achieved better counselor knowledge and practice than the comparison site, and 4) achieved better mother knowledge than the comparison site. For example, mothers' reports indicated that intervention counselors demonstrated feeding techniques far more frequently than comparison counselors, and the intervention counselors all recommended six months of exclusive breastfeeding for the mothers who intended to breastfeed, while the comparison counselors almost always advised three, four, or five months. The intervention mothers had more complete knowledge on the definition and benefits of exclusive breastfeeding for six months and knew that it was best for the baby's health, growth, and immunity, as well as for HIV-infection prevention. They were able to cite more ways to protect their baby from HIV infection, including breast care. The job aids were universally used by the intervention counselors, and over 90% of the intervention mothers referred to and could show the take-home materials during the home interview.

The results about mother infant-feeding practices were less clear-cut, in part because at least six months of practice are needed to judge mothers' compliance with recommended feeding practices, rather than the one month obtained for the intervention mothers in this study. In addition, the interviews were limited in enabling the researches to assess PMTCT counselors' success in determining whether mothers could meet "AFASS" criteria in selecting the most appropriate infant-feeding options based on each mother's situation. AFASS stands for:

- Acceptable: mother perceives no social or cultural barriers to the feeding method;
- Feasible: mother/family has the time, knowledge, skills, and other resources necessary for the feeding method;
- Affordable: mother/family can afford the feeding method for a year or more if necessary;
- Sustainable: supply of inputs needed will be available and accessible for a year or more; and
- Safe: the infant foods can be correctly prepared and stored.

The study concludes that an integrated program of counseling job aids, take-home materials, and counselor training will probably increase counselors' and mothers' knowledge, improve infant feeding-related behaviors and safer sex during the breastfeeding period, and lead to improved health outcomes for both HIV-positive and HIV-negative mothers and their children. However, it also underscores the complexity of translating the global recommendations on HIV and infant feeding to the local context and of developing culturally appropriate counseling tools. Issues surrounding informed choice and counselors' ability to evaluate the AFASS conditions of individual mothers require additional thought and consultation at the national and international levels.

I. INTRODUCTION

A. PMTCT Guidelines and the Quality Assurance Project

International guidelines on infant feeding in the context of HIV/AIDS seek to reduce infant and young child morbidity and mortality in the general population; to prevent mother-to-child transmission (MTCT) and unintended pregnancies in the HIV-positive population; to prevent HIV infection in general; and to provide care, treatment, and support to HIV-positive women, their infants, and families.

The guidelines differentiate between HIV-negative and HIV-positive mothers. The former are advised to initiate breastfeeding within an hour of birth, breastfeed exclusively for the first six months, and then gradually introduce complementary foods while continuing to breastfeed. HIV-positive mothers who meet certain criteria are advised to replacement feed from birth. If they cannot meet replacement feeding criteria, they are urged to exclusively breastfeed, avoiding all mixed feeding, and then to switch to exclusive replacement feeding as soon as they can meet the criteria. The fact that many mothers cannot meet the criteria poses a challenge.

The criteria are referred to as AFASS, an acronym derived from the following:

- Acceptable: mother perceives no social or cultural barriers to the feeding method;
- Feasible: mother/family has the time, knowledge, skills, and other resources necessary for the feeding method;
- Affordable: mother/family can afford the feeding method for a year or more if necessary;
- Sustainable: supply of inputs needed will be available and accessible for a year or more; and
- Safe: the feeding materials can be correctly prepared and stored.

Replacement feeding includes several options, each with its own standards: commercial infant formula, modified animal milk, expressing and heat treating breast milk, wet nursing, and appropriately prepared liquids and solids (sometimes referred to as complementary or weaning foods). Numerous other feeding practices are addressed in the guidelines and are summarized in Appendix 1 here.

The guidelines also cover counseling on infant feeding. Counselors should establish the right conditions for counseling: Have a good attitude, greet the client, offer her a seat, establish trust, and respect confidentiality. They should listen to a mother carefully and guide her in making an *informed* choice of feeding method after discussing the advantages and disadvantages of options. They should give advice clearly, precisely, and comprehensibly; demonstrate positioning and attachment for those who choose breastfeeding; and demonstrate safe and appropriate preparation of replacement foods for those who choose replacement feeding.

Funded by the United States Agency for International Development (USAID) and managed by University Research Co., LLC (URC), the Quality Assurance Project (QAP) offers technical assistance in the management of quality assurance and workforce development in healthcare, helping develop feasible, affordable approaches to comprehensive change in health service delivery. URC and QAP have extensive experience in the development, evaluation, and application of job aids and client take-home materials to improve system performance (Edson et al. 2002; Edson et al. 2004; Hurtado and Koniz-Booher 2003). QAP advocates an approach to the development of such aids that:

- Engages key stakeholders (local, national, and/or international) and sometimes “star performers” in the design of the overall strategy and materials development and at critical stages in the technical review process;
- Reflects accepted norms and standards that promote behaviors shown by evidence to promote good health;

- Presents consistent and complementary text and illustrations for use by providers and clients;
- Presents materials that are visually engaging and attractive, including full-color printing (when affordable);
- Encourages benchmarking and the adaptation of existing materials to reflect local contexts and incorporate technical feedback and the results of field testing;
- Uses a computer-assisted graphic arts methodology to facilitate revisions to the text and illustrations, reducing the cost and other barriers to producing quality materials; and
- Plans dissemination and scale-up from the beginning, including training users in the effective use of the job aids.

All these principles were applied in the present study, as were the international guidelines and World Health Organization (WHO) draft, generic counseling tools and guidance on the adaptation of the global recommendations to the local context.

B. Prevention of Mother-to-child Transmission in Tanzania

In Tanzania, poor infant-feeding practices contribute to about a third of transmissions (Tanzania Ministry of Health 2004). Based on a vertical MTCT rate of 40%, 72,000 Tanzanian babies are estimated to be infected annually through their mothers, approximately 25,000 of them through breastfeeding.

To address vertical transmission, the Tanzania Ministry of Health (MoH) collaborated with UNICEF to launch a pilot program in 2000 on the prevention of mother-to-child transmission (PMTCT). The program had five components: (1) voluntary counseling for HIV testing at antenatal clinics, (2) anti-retroviral drugs for PMTCT, (3) obstetric care for HIV-positive pregnant women, (4) infant-feeding counseling, and (5) laboratory services for HIV testing. Implemented in five hospitals, including Kilimanjaro Christian Medical Centre (KCMC), its purpose was to determine the feasibility and desirability of integrating PMTCT into routine reproductive and child health services countrywide (Tanzania MoH 2004).

The Centers for Disease Control and Prevention (CDC) supported an assessment of the Tanzanian PMTCT pilot program (Swartzendruber, Msamanga, and PMTCT Evaluation Team 2002). Findings noted the importance of training PMTCT counselors, appropriate support materials (e.g., provider job aids) for use in infant-feeding counseling, and educational materials for mothers to remind them later of the counseling discussions. Lack of such training and materials stimulated the research reported here.

C. Research on Infant-feeding Practices in Tanzania

The early introduction by Tanzanian mothers of water and traditional foods soon after birth and the high prevalence of mixed feeding of infants under six months were documented previously (de Paoli et al. 2001; National Bureau of Statistics and Macro International, Inc. 1999). In Kilimanjaro Region, mixed feeding where the baby is breastfed and given water, cow milk, or porridge is common (de Paoli, Manongi, and Klepp 2002). Many PMTCT counselors are not well informed about how to protect babies from MTCT, and few know of national or international guidelines on HIV and infant feeding (de Paoli, Manongi, and Klepp 2002; Leshabari et al. 2006). Inaccurate and inconsistent information and lack of adequate time for counseling also limit HIV and infant-feeding counseling in Tanzania and other settings (Adejuyigbe and Odebiyi 2004; Chopra et al. 2005; de Paoli, Manongi, and Klepp 2002).

Our first author, SL, conducted formative research in the KCMC catchment area (Leshabari et al. 2006) just prior to and during the initial phase of this study. That report highlights general confusion about the risk of transmission among PMTCT counselors and the community at large. Many counselors believed that if the mother was HIV-positive, the baby would be, too. Counselors expressed difficulty in assessing individual women's situations and in guiding HIV-positive women in choosing the infant-feeding options

that would be best for them and their babies. Many counselors believed that exclusive breastfeeding is the best option but infeasible beyond three months. Some complained that their caseloads were too high, precluding counseling made lengthy by individualizing the discussion, or by using a decision algorithm to guide a mother's choice. Some breastfeeding mothers reported mixed feeding as early as two months after birth. Factors contributing to early mixed feeding included cultural practices, sore and cracked nipples, and working outside the home. The research also identified fear of stigma and discrimination associated with replacement feeding and other difficulties regarding the affordability and safety of commercial formula and home-modified animal milk.

The formative research found that only three feeding methods are acceptable to mothers in this region: exclusive breastfeeding, cow milk, and formula. Wet nursing, once culturally acceptable, was considered dangerous in the context of HIV, while heating expressed breast milk was rejected due to association with an infant's death and the perceived relationship between breast milk and blood.

That research also identified many HIV-positive women concerned that they had not been given enough information about the required amount, frequency, and preparation of replacement foods. Few could recall receiving infant-feeding information at counseling, perhaps because they were upset and/or confused to learn their HIV status. New mothers' husbands, mothers, and mothers-in-law in Tanzania traditionally have the final say about infant feeding, including whether and how long to breastfeed, although the formative research found that mothers viewed health workers as the most trusted source for health education.

Building on these findings and other international studies and recommendations on infant-feeding counseling in PMTCT settings (WHO 2003a and b; Koniz-Booher et al. 2004) and in response to the international call for action, QAP and the University of Bergen (Norway) initiated an operations research study in the fall of 2003 to develop and test an integrated program of provider training, counseling job aids, and mother take-home materials. KCMC agreed to serve as the study site. The study sought to improve the quality of infant-feeding counseling by PMTCT counselors at KCMC and to strengthen HIV-positive mothers' ability to both make an informed choice and safely practice a feeding method appropriate for their personal situation.

D. Job Aids and Take-home Materials

Job aids are materials that help a worker do a job; examples include posters and instructional cards. Those used for this study, like many others, are intended to guide clients through a series of steps, even helping them develop personalized information and clarify their values and risk exposure in the context of health-related options (Kim et al. 2005; Knebel et al. 2000; Lahaie, Burkhalter, and Kelley 2002; Moore 2001a and b; O'Connor 2003; Rowe et al. 2005). Job aids are commonly viewed as a cost-effective way to improve the performance of healthcare providers, such as nurse-counselors, and are credited with reducing guesswork, minimizing reliance on memory, and promoting compliance with standards. A systematic review of methods to improve health worker performance concluded that job aids were effective in improving performance, but only when used as part of a multi-faceted intervention that also included training and possibly other complimentary actions, such as mass media, client instructional materials, and supervision (Rowe et al. 2005). Client take-home materials, typically referred to by healthcare providers during counseling and given to clients for later referral, include brochures, diaries, and calendars. This study was designed on the basis of available evidence on the use of job aids and instructional materials by service providers (PMTCT counselors) and clients (mothers participating in a PMTCT program).

II. STUDY OBJECTIVE

The overall study objective was to develop and test an integrated program comprising counselor job aids, mother take-home brochures, and training on infant-feeding counseling, informed choice, and safe feeding. The study aimed to answer the following questions:

Counselor performance: Can the intervention improve counselors' infant-feeding knowledge and performance?

Practices of HIV-positive mothers: Can the intervention improve HIV-positive mothers' infant-feeding knowledge and practices, where improved practice means greater adherence to guidelines for this population?

Practices of HIV-negative mothers: Can the intervention improve HIV-negative mothers' infant-feeding knowledge and practices, where improved practice means greater adherence to guidelines for this population?

III. METHODS

Approval to conduct the research was obtained from national, regional, and local authorities, including the Tanzania National AIDS Control Programme (NACP), the medical authorities in Kilimanjaro Region, and the ethics committee of the KCMC and Muhimbili University College of Health Sciences. This section details subsequent steps in conducting the study.

A. Developing the Intervention

The above-described approach for developing job aids was followed. In particular, both the planning and development processes were participatory, involving all key stakeholders and representative policy makers, providers, and clients. Several external HIV and infant-feeding experts, both national and international, were invited to participate during critical stages (Leshabari et al. 2006).

Drafting, reviewing, and revising the materials: The first draft of materials was based on HIV and infant-feeding counseling materials previously used in Tanzania and the region and a draft of generic counseling tools then being developed by WHO. The research team made initial decisions about possible technical content, illustrations, and formats for conceptualized counselor job aids and mother take-home brochures on the basis of findings from the formative research. The team visited several homes of mothers and other community members, observing dress and home life, including infant feeding. They requested permission to take photographs for use in developing illustrations. Illustrations were developed by professional artists and QAP's behavior change communication and graphic arts team who then prepared prototypes. Both internal and external technical experts reviewed the prototypes, adjusted them based on feedback, and then field tested them with counselors and mothers. The graphics software facilitated modification of illustrations throughout development. All materials were developed in tandem in English and Swahili to ensure the broadest possible technical review.

Field test of illustrations and draft materials: The field test was designed to ensure that the aids were culturally appropriate and acceptable in the local context. Initial mock ups of the illustrations were tested in four focus group discussions with mothers and community members in different villages near Moshi town and discussed with KCMC counselors. For this purpose, a laminated, color copy of each image was passed among participants so they could see the colors and other details of the images. Each participant also received a black and white photocopy of each image to hold and consider during the discussion. Next, the research team observed simulated PMTCT counseling sessions where the materials helped focus discussion on infant-feeding options. (Simulation was required due to institutional restrictions on observations of actual counseling sesstions.) This process provided essential community and counselor

feedback that enhanced the overall quality and acceptability of the images, provided insights into client-provider interactions, underscored the importance of illustrations in communicating key messages, and led to more revisions of the illustrations before copies of the aids were printed for the evaluation. (Details of the field-testing process and findings are reported in Leshabari et al. 2006.)

Integrated set of job aids and take-home brochures: The research team developed two job aids and four mother take-home brochures also used as job aids. All materials incorporated colorful and realistic illustrations to help communicate key messages and balance the text presented. This comprehensive approach resulted in interventions designed to improve "system behavior," not just behavior of individuals (e.g., PMTCT and mothers, respectively) in the system. Appendix 2 shows images of the job aids and brochures; they can be viewed in their entirety at www.qaproject.org. By the start of the evaluation, the following materials were ready:

Depiction of the photo-to-illustration process used to create images for the infant-feeding counseling tools

1. Job aid on relative risk: "What is the risk of HIV passing from HIV-positive mothers to their babies when NO preventive actions are taken?"
2. Job aid: Question & Answer (Q&A) Guide: "HIV & Infant Feeding: Answers to Questions Commonly Asked by Mothers, Their Families and Communities."
3. Job aid and take-home brochure: "How to Breastfeed Your Baby."
4. Job aid and take-home brochure: "How to Feed Your Baby Infant Formula."
5. Job aid and take-home brochure: "How to Feed Your Baby Fresh Cow's Milk."
6. Job aid and take-home brochure: "How to Express & Heat Treat Breast Milk."

Counselor training program: A one-day training course for KCMC's PMTCT counselors focused on the guidelines, interpersonal communication and counseling, and effective use of the aids (Appendix 3 presents the agenda). Training content was based on the WHO draft orientation curriculum for use in training on HIV and infant-feeding generic counseling materials. Draft copies of the job aids and brochures, in both English and Swahili, were given to participants for use during the training and to take home. Participants broke into small groups to review and discuss each aid to ensure that everyone understood the content. Role plays using the various aids reinforced interpersonal communication and counseling skills and allowed participants to discuss different situations.

For HIV-negative mothers, the training taught counselors to use the breastfeeding brochure to promote exclusive breastfeeding (EBF) for the infant's first six months and to use the job aid on relative risk to encourage safe sex to prevent HIV infection. For HIV-positive mothers, the training taught counselors to use the job aid on risk to discuss the relative risks of transmission during breastfeeding versus other causes of mortality and morbidity associated with replacement feeding and to discuss the importance of safe sex to avoid re-infection or the infection of others. Counselors were also taught to use the Q&A with HIV-positive mothers to present infant-feeding options and the advantages and disadvantages of each. Counselors were urged to support an informed choice of feeding method given the AFASS criteria and the mother's circumstances. For both HIV-negative and HIV-positive mothers, the training asked counselors to show and read aloud the infant-feeding take-home brochure that corresponded to the mother's choice and to give her a copy.

Demonstration toolkit: After the training, participants recommended assembling a demonstration toolkit for use at KCMC. The study team put together a box containing cups, spoons, a sample tin of formula, a thermos, a pot, sugar, micronutrients (to demonstrate preparing infant formula and cow milk), and hand and dish soaps (to demonstrate hand and utensil washing).

B. Evaluation Design

General evaluation strategy: The evaluation used a quasi-experimental design that compared an intervention group to a comparison group. The former comprised 30 mothers from the PMTCT program at KCMC. These mothers were served by four counselors who had taken the training and had all the counseling materials and the demonstration toolkit. The comparison group comprised 30 mothers from two other PMTCT programs (Majengo and Pasua Clinics) in the same district as KCMC (Moshi); they and their counselors were not exposed to the intervention, except as noted below.

Semi-structured home interviews and observations were conducted with intervention mothers about a month after delivery and with comparison mothers on average about nine months after delivery. These sessions collected data on the following research topics: each mother's understanding and beliefs on HIV and infant feeding, intended infant-feeding method, problems experienced, and the quality of the infant-feeding counseling. Twenty of the 59 mothers were home interviewed a second time to validate data from the first interview, assess whether the intended feeding method was being practiced, and obtain additional feedback on the perceived value of the counseling materials.

Pre- and post-knowledge tests were taken by the intervention counselors to estimate the training's impact on their HIV and infant-feeding knowledge.

Selection, training, and payment of counselors: KCMC had 16 nurse-midwives with diplomas in public health who had been serving as PMTCT counselors; all participated in the training. Of these, four were selected to participate in the evaluation because they demonstrated good rapport with clients and were enthusiastic about the study. Two comparison counselors were selected by physicians responsible for PMTCT programs at the two comparison clinics. These counselors received individualized orientation on the purpose of the study and their role in recruiting mothers. Neither received additional training or exposure to the counseling materials, guidelines, or demonstration kit. All six counselors received a small honorarium to help defray the communication (pre-paid cell phone cards) and transportation costs associated with recruiting mothers. No other incentive was offered.

Simulated counseling sessions: Since confidentiality and ethics regulations prohibit observation of counseling sessions, the research team observed and videotaped a simulated counseling session of each intervention counselor prior to the training and immediately afterwards. The observer used a checklist to record counselors' interpersonal communication skills. Counselors and observers participated in a focus group discussion after the second simulated session to identify problems during the simulations and propose solutions.

Selection of mothers: An intervention counselor recruited a stratified sample of 20 HIV-positive and 10 HIV-negative mothers who were counseled during February–June 2004. Mothers were selected on the basis of the timing of their deliveries and willingness to participate (no recruited intervention mother refused to participate). The comparison group was intended to be a stratified sample of 20 HIV-positive and 10 HIV-negative mothers who had been previously counseled by one of the two comparison counselors and who agreed to participate. Many mothers identified by the comparison counselors refused to participate, which caused delay and resulted in our having substantially older comparison infants than intervention ones; the possible effect of this difference is discussed below. Also, one comparison mother went to the intervention site for postpartum care and received the take-home materials; she was removed from the group, leaving 19 HIV-positive and 10 HIV-negative comparison mothers. In all, 59 mothers agreed to participate in writing and to receive one or two home visits.

Characteristics of mothers: A complete set of data was obtained for almost all 30 intervention and 29 comparison mothers. No significant difference existed between the intervention and comparison groups in terms of the mother's age, years of education, marital status, religion, or sex of the newborn (Table 1). However, intervention group infants were younger on average than comparison infants: a month versus nine months old, respectively, at the first interview. Mothers participating in the second home interviews were also similar on average to those participating in the first.

Table 1: Characteristics of Mothers and Newborns

	Intervention Group		**Comparison Group**	
	HIV-negative	HIV-positive	HIV-negative	HIV-positive
Characteristics at the first interview				
Sample size	10	20	10	19
Average maternal age at birth (years)	26.2		27.9	
Average years of mother education	7.5		6.7	
Percent married	76.7%		55.2%	
Percent Christian (Moslem)	76.7% (23.3%)		62.1% (37.9%)	
Sex of infant (percent male)	40.0%		41.4%	
Average age of infants at first interview (months)	1.0		9.0	
	0.9	1.1*	10.4	6.3
Characteristics at the second interview				
Sample size	8	5	4	3
Average time between interviews (months)	1.6	1.7	1.4	1.2
Average age of infants at second interview (months)	2.6		10.7	
	2.5	2.8	12.5	8.3

* n = 19.

Home visits and interviews: Each home visit involved both an interview with the mother and observations. An experienced interviewer, accompanied on some visits by the first author (SL), conducted all home visits. The interviewer had been introduced to each mother by her counselor. The interviews were long and intimate.

The first home interviews were guided by a semi-structured list of over 40 questions that had been drafted in English and translated into Swahili, tested with two mothers, revised, and printed (Appendix 4). The interviewer used the list as a guide to ask questions, and then she recorded the answers in Swahili on a provided, pre-printed form. The guide included instructions on what to observe, including the general condition of the home environment; infant-feeding behaviors (e.g., positioning at the breast); and the presence of any infant-feeding items, such as cans of formula, bottles, or a thermos.

Second home visits were conducted by the same interviewer with 13 intervention and 7 comparison mothers about four to six weeks after the first one. These visits also involved both an interview and observation. They investigated changes in knowledge and practice related to infant feeding since the first visit and intervention mothers' reactions to and use of the take-home brochures (Appendix 5 presents the interview guide).

Final group discussion: Lastly, the intervention counselors participated in a group discussion with the study team to describe their experiences and recommendations.

Analysis: The data were analyzed in several steps:

- The pre- and post-test scores of the 16 counselors were analyzed.
- The first author and interviewer (both of whom are bilingual in English and Swahili) reviewed the interview responses and translated them into English. These responses were then entered into an electronic file.
- The authors transformed the unstructured interview responses into structured data as follows: First, they defined categories of answers to each question and assigned each answer to the most appropriate category. Where appropriate, they added new categories. Next, they defined seven research questions of interest to the evaluation and identified the interview questions that elicited important information about each (Appendix 6). The data thus obtained were entered into an electronic file and appropriate quantitative and qualitative analyses performed.

IV. RESULTS

A. Use of Counseling Materials

At the first interview, essentially all intervention mothers reported the training instructions had been followed (Table 2). All 30 of these mothers reported that the counselor had showed them one or more brochures, and all these mothers could describe them. All but one reported that the counselor had read a brochure aloud for them; the exception was a teacher who told the counselor she did not need to do so. All 30 reported they had received a take-home brochure, and 29 could produce it.

Comments on observations of intervention mothers at the first interview included:

> *During the interview, the [HIV-positive, replacement-feeding] mother was reading through the brochure and referring to it to make sure what she was saying is what is written in it. There was no evidence that the mother was using any other method to feed the baby.*
>
> *The [HIV-positive breastfeeding] mother seems to speak very freely and with confidence. She was counseled with her husband so life is a bit easy for her. She tries to adhere to the decision from the counseling; she doesn't have confidence to leave her baby with anybody to avoid accidentally giving any other food than her own breast milk. She was always reading from the brochure and looks trustingly at it. She said that she will be very happy if the baby does not become infected.*

Intervention mothers gave favorable responses when asked at the first interview whether they had any trouble reading their brochure, what they thought of the illustrations, and what they liked most about it: 29 said the brochure was clear and understandable, and all 30 thought the illustrations reflected their own community. None expressed difficulty understanding the language. Responding to, "What do you think of the illustrations?" some said:

> *Yes, the pictures show exactly how mothers in our communities dress and breastfeed our babies.*

The pictures show the usual mothers in our communities, even the type of firewood is very common in the rural areas.

Yes, the mothers shown are like the usual women in our community, especially that one showing a mother sleeping on a mat. It is typical of what is being done by most mothers in the afternoon.

Table 2: Intervention Mothers' Reports on Counseling Materials: First and Second Interviews

Responses	Intervention Group		Total
	HIV-negative[1]	HIV-positive[1]	
Counselor showed counseling aids to mother (1st interview)	10 / 10	20 / 20	30 / 30
Counselor read materials to mother (1st interview)	10 / 10	19 / 20[2]	29 / 30
Mother could describe the counseling aids (1st interview)	10 / 10	20 / 20	30 / 30
Mother said she received take-home brochure (1st interview)	10 / 10	20 / 20	30 / 30
Mother could show take-home brochure (1st interview)	10 / 10	19 / 20	29 /30
Mother's reaction to take-home brochure (1st interview):			
- Brochure was clear and understandable			29 / 30
- Illustrations were representative of community			30 / 30
- Disliked language			0 / 30
- Liked the images in the brochure			20 / 30
- Disliked something about one of the images in the brochures			10 / 30[3]
Mother still using take-home brochure (2nd interview)	2 / 3[4]	7 / 8	9 / 11
Reasons she continued to use the brochure (2nd interview):			
- To recall measurements in preparation of complementary foods	0 / 3[4]	3 / 8	3 / 11
- To recall positioning during breastfeeding	2 / 3[4]	4 / 8	6 / 11
Type of additional information requested by mother (2nd interview):			
- Transitioning from infant formula to cow milk	0 / 5	3 / 8	0 / 13
- Transitioning from breastfeeding to infant formula	1 / 5	1 / 8	2 / 13
- Transitioning from breastfeeding to cow milk	1 / 5	3 / 8	4 / 13
- Complementary foods and cow milk	2 / 5	1 / 8	3 / 13

Notes: 1. The first interview sample size was 10 HIV-negative and 20 HIV-positive mothers, and the second was 5 HIV-negative and 8 HIV-positive mothers; some responses were not given/recorded for the entire sample, as noted. 2. One woman said she did not need the materials read to her. 3. Reasons for disliking images: Breast too exposed (5); image of money would discourage use of formula (3); mother lying down while feeding (2). 4. Responses of 2 HIV-negative mothers were not recorded; responses of all other mothers (still using or not still using) were recorded.

To the question, "What do you like most about the brochures?" typical responses from intervention mothers included:

The illustrations and writing teach not only me, but everyone who reads it. A good example is my husband. After having read it, he refers to what is written there whenever he wants to insist to me what I should do. It gives me a sense of confidence that what I'm doing is the right thing.

The illustrations are simple and clear. They don't target the few rich women, like showing electric cooker, which is not the real practice in the villages. Most mothers will be attracted to read them because of their attractive colors and [because they] show the real practice of most mothers, such as putting on khanga or using firewood.

Even without the words you can figure out what is being done. . . . Even people who cannot read can follow the pictures very well to know what is written.

Asked at the first interview whether they liked the images, 20 said they did, and 10 mentioned aspects of images that they did not like. Five said the breastfeeding mothers' breasts should be covered more; three said the image of money in the infant formula brochure would discourage mothers from using formula; and two thought that the woman lying on the mat looked uncomfortable. These comments were considered during subsequent revisions.

Eight HIV-positive and five HIV-negative intervention mothers had second interviews. Asked, "Are you still using the brochure, and if so, have you shared it with anyone?" seven HIV-positive and two HIV-negative mothers said they were still using the take-home brochure. Some said:

> *I read the brochure whenever I feel like reading it. When I discuss breastfeeding with my friends, I usually show them what is written in that brochure, because most people believe in giving water to the baby from very early, even from the second week after birth.*
>
> (HIV-negative, breastfeeding mother)

> *Yes, I'm still using the brochure to remind myself how much the baby needs as he grows. . . . [Besides me] only my husband reads it because I don't like other people to know that I'm not breastfeeding*
>
> (HIV-positive, replacement-feeding mother)

The second interviews also revealed the need for additional counseling aids, and as a result several complementary materials, discussed below, were subsequently developed.

B. Providers' Knowledge and Practice

Knowledge test scores: Intervention counselors anonymously took a short, written knowledge test before and after the training; 16 took the pre-test and 13 the post-test (three left early). The test had 12 questions weighted by importance. The mean test score jumped from 54% before to 77% after, with a pre-test range of 24–84% and a post-test range of 48–92%. Mean post-test scores were higher than the mean pre-test scores for each question.

Advice on duration of exclusive breastfeeding: The guidelines specify six months of EBF for infants of HIV-positive mothers and longer breastfeeding (with complementary food/liquids) for infants of mothers who are negative. Of 59 mothers at the first home interviews, 54 expressed an intent to breastfeed: all 20 HIV-negative mothers and 34 of the 39 HIV-positive ones. Most intervention mothers said they had been advised to EBF for six months, while most comparison mothers, both HIV positive and negative, said they had been advised to EBF for three to five months. Of 26 intervention mothers who chose to breastfeed, 23 (88%) said they were counseled to EBF for six months; none for three to five months; and three (12%) could not recall any duration advice. In contrast, of the 28 comparison mothers who so chose, only 2 (7%) said they had been counseled to EBF for six months; 23 (82%) reported three to five months; and three (11%) did not recall any duration advice (Table 3). We conclude that the intervention group received better duration counseling than the comparison group.

Advice on safe sex, mixed feeding, and breast care: Three other messages were measured to judge the quality of counseling: the importance of safe sex, dangers of mixed feeding, and appropriate breast care. The last is important because breast inflammation may interfere with breastfeeding and because certain breast conditions increase the risk of MTCT (Semba et al. 1999; Willumsen et al. 2003). Table 3 shows that safe sex was discussed with most intervention (80%) and comparison (66%) mothers. However, the dangers of mixed feeding were not discussed with many intervention (17%) or comparison mothers (10%). Appropriate breast care was discussed with most of the intervention mothers (87%; the remainder were not breastfeeding) but with only two comparison mothers (7%).

Table 3: Mothers' Reports on Advice on EBF Duration and Feeding Demonstration

Advice	Intervention Group (n=30)		Comparison Group (n=29)		Total (n=59)
	HIV-negative (n=10)	HIV-positive (n=20)	HIV-negative (n=10)	HIV-positive (n=19)	
Number of breastfeeding mothers who reported receiving advice on duration					
- 6 months	8	15	0	2	25
- 3–5 months	0	0	10	13	23
- No recall of counseling on duration	2[1]	1	0	3	6
Number that breastfed	10	18	10	18	54
Number of mothers who reported receiving advice on various topics, by topic					
- Safe sex	7[2]	17	4	15[2]	43
- No mixed feeding	3[2]	2	-	3[2]	8
- Breast care information	10	16	1	1	28
- Other measures	1[3]	-	-	6[4]	7
- Not counseled	-	-	-	3	3
Number of mothers who reported receiving a demonstration on feeding, by topic					
- Any feeding demonstration	10	19	-	-	29
- Breastfeeding demonstration: positioning	10	15	-	-	25
- Replacement feeding (RF) demonstration	-	4	-	-	4
RF: cup versus bottle	-	1	-	-	1
RF: measuring/mixing	-	1	-	-	1
RF: preparation	-	4	-	-	4

Notes: 1.One of these mothers planned to EBF for 3 months, the other 4. 2. Two mothers were counseled about safe sex and about no mixed feeding. 3. The other message was to keep the baby clean and start family planning early. 4. Other messages were be faithful in marriage and keep baby clean (2); keep baby clean (3); keep baby and environment clean (1).

Expression of breast milk: Expression and heat treatment of breast milk is useful for mothers who will sometimes be separated from their infants and for the transition from breastfeeding to replacement feeding. No mother mentioned being taught this method. This finding underscores the importance of encouraging counselors to teach this method to all breastfeeding women and to provide them with appropriate utensils and soap if necessary. Counselors recommended developing another counseling aid or take-home brochure on this method to stimulate more discussion and encouragement of the practice.

Demonstrations: A demonstration of a behavior can reinforce learning and increase the likelihood that the behavior is adopted. Of the 30 intervention mothers, 29 (97%) reported that the counselor provided an infant-feeding demonstration, compared to none of the 29 comparison mothers. Proper breastfeeding and positioning were demonstrated to 26 intervention mothers. These reports convince us that the quality of counseling with respect to the use of a demonstration was superior in the intervention group.

AFASS and counseling about infant-feeding method (IFM): The interview data preclude a judgment about the quality of IFM counseling. Prohibitions on the observation of counseling and the length of time between the counseling sessions and first interviews prevented our learning whether women were appropriately guided through the AFASS criteria.

We do know that three of the four HIV-positive intervention mothers who chose to replacement feed were counseled to do so; two of them said they were still replacement feeding exclusively at the first interview (about one month after birth), while one was mixed feeding (formula and breast) at her interview (19 days after birth). The fourth was counseled to breastfeed but was convinced to replacement feed by her mother,

a nurse. She said she was still exclusively replacement feeding 34 days after birth. The one comparison mother who chose replacement feeding said she had been counseled to do so and that she was still replacement feeding exclusively at the interview, 96 days after birth. Note that we could identify mothers who failed to maintain their feeding choice before the interview, but not those who failed afterward (Table 4).

Table 4: Mothers' Reports on Feeding Advice, Practice, and Possible AFASS Compliance: First Interview

	Intervention Group (n=30)		Comparison Group (n=29)		Total (n=59)
	HIV-negative (n=10)	HIV-positive (n=20)	HIV-negative (n=10)	HIV-positive (n=19)	
Advice					
- Breastfeed exclusively	10	2	10	8	30
- RF exclusively	0	18	0	10	28
- None given; mother chose to breastfeed	0	0	0	1	1
Method *chosen* at birth:					
- Breastfeed exclusively	10	16	10	17	53
- RF exclusively	0	4	0	2	6
Total	10	20	10	19	59
Of mothers advised to breastfeed, those who …					
- Chose to breastfeed, as counseled	10	1	10	8	29
- Chose to RF, rejecting the counsel	0	1	0	0	1
Counselor supported mother's RF decision	-	1	-	-	1
Of mothers (all HIV-positive) advised to RF those who …					
- Chose to RF, as counseled	-	3	-	1	4
- Chose to BF, rejecting the counsel	-	15	-	9	24
Counselor supported mother's BF decision	-	14	-	4	18
Counselor did not support BF decision	-	1	-	5	6
Method recommended to HIV-positive mothers, method chosen, and result or reason					
- RF recommended, chosen, and exclusively practiced		3	-	1[2]	4
- RF recommended and chosen: mixed		0	-	0	0
- BF recommended; RF chosen and exclusively practiced		1	-	0	1
- BF recommended; RF chosen: mixed		0	-	0	0
- RF recommended; BF chosen due to cost or stigma		14	-	4	18
Reasons for not choosing/achieving exclusive replacement feeding					
- Evidence of unaffordability of RF		4	-	7	11
- Evidence of unacceptability of RF	-	9	-	5	14
- Evidence of both		3		0	3

Notes: 1. RF includes formula (16 mothers), cow milk (10 mothers), and combined (1 mother). 2. Mother breastfed in hospital for 2 days but switched at hospital's request. "BF" is breastfeeding.

We asked at the first interview for both the initial feeding method recommended by the counselor (before delivery) and the feeding method selected. Most HIV-positive intervention mothers said they had been advised to replacement feed (18/20 = 90%) but only 53% of HIV-positive comparison mothers (10/19) said the same. Many HIV-positive mothers said that their counselor recommended replacement feeding

but that she (the mother) chose to breastfeed because she could not afford replacement milk or feared disclosing her HIV status: 15 of the 18 intervention mothers and 9 of 10 comparison mothers. In all but one case, the mother reported that the counselor had supported the decision and counseled helpfully about breastfeeding. The question is whether the counselor mis-analyzed the AFASS conditions of the mother or whether this was a technique used by the counselor to get the mother to recognize her own limitations with respect to AFASS. We cannot answer this question from the data obtained.

C. Mothers' Understanding, Feeding Choice, and Practice

Mothers' knowledge and beliefs about infant-feeding methods: We asked mothers which feeding method would be best for most babies in their community, and all endorsed breastfeeding (Table 5). For babies of HIV-positive mothers, four said that breastfeeding is best, and 46 said that replacement feeding is best, most of the latter citing avoidance of HIV infection as the reason. (Mothers' reasons for supporting breastfeeding or replacement feeding are detailed in Table A-1, Appendix 7.)

Table 5: Mothers' Understanding of Infant Feeding: First Interview

Topic	Intervention Group (n=30)		Comparison Group (n=29)		Total (n=59)
	HIV-negative (n=10)	HIV-positive (n=20)	HIV-negative (n=10)	HIV-positive (n=19)	
Best infant feeding method for most babies in the community					
- Breastfeeding	10	20	10	19	59
- Replacement feeding	-	-	-	-	-
Best infant feeding method for babies of HIV-positive mothers					
- Breastfeeding	1	2	-	1	4
- Replacement feeding	7	18	6	15	46
- Don't know	2	-	4	3	9
Quality of definition of exclusive breastfeeding (3=strong definition, 0=no definition)					
- Mean score of definition[1]	2.6	2.2	0.1	0.4	1.3
How long mothers should exclusively breastfeed					
- 3–5 months	2	3	10	17	32
- 6 months	8	17	-	2	27
How long mothers can exclusively breastfeed					
- 1–5 months	9	20	10	19	58
- 6 months	1	-	-	-	1

Notes: 1. Levels of the quality of the definitions and numeric score associated with each are: Mother gave strong definition (3 points); mother gave most of the definition (2 points); mother gave a partial definition (1 point); mother did not know (0 points).

We asked mothers what it means to "exclusively breastfeed" and ranked their answers from "strong" (most of the full definition) to "no knowledge," according to the WHO definition of exclusive breastfeeding.[1] Most intervention mothers (28 of 30) gave a strong definition, while only four of the 29 comparison mothers did. This contrast in understanding probably reflects the fact that the counselors

[1] Exclusive breastfeeding is breastfeeding in the absence of all other fluids and solids and is recommended for up to six months of age, during which time breast milk alone can satisfy an infant's nutritional and fluid needs. Drops or syrups containing vitamins, mineral supplements, or medicines can be given in addition to breast milk.

were trained to fully explain the definition of EBF, and the counseling and take-home materials contained the definition.

We also asked the mothers how long EBF should be practiced and how long mothers in their community actually can practice it. The guidelines indicate that the correct answer to the "should" question is six months and seem to suggest that this would also be the answer to the "can" question. The mothers' answers differed between the intervention and comparison groups: 25 of 30 (83%) intervention mothers said that mothers should breastfeed for six months, while only 2 of 29 of comparison mothers (7%) did. However, the intervention mothers responded very differently to the "can" question: Only one (3%) said six months, and the rest said one–five months. No substantial differences occurred by HIV status.

To better understand the mothers' responses on duration, we more deeply analyzed their comments on underlying reasons (Table A-2, Appendix 7). Counselors' advice clearly influenced the answers to the question, "How long do you think a mother who breastfeeds should 'exclusively breastfeed' her baby and why?" Many intervention mothers said six months because that is what their counselors advised, whereas many comparison mothers said three–four months reflecting their counselors. The most frequent reasons given by both sets of mothers to the question, "How long do you think most mothers in this community CAN exclusively breastfeed their babies and why?" were: insufficient milk, bad for mother's health, and mother cannot stay at home longer. The "should" responses indicate that mothers pay attention to counselors' advice, while the "can" question indicates that mothers believe, at least by the time their babies are one–nine months old, that sustaining exclusive breastfeeding is problematical. This suggests two things: 1) strengthen counseling so that mothers learn more about how long most mothers are able to exclusively breastfeed, how to overcome insufficient milk problems, the relationship between breastfeeding and a mother's health, and options for mothers who cannot say at home all the time, including manual expression; and 2) practical limitations to EBF that mothers cannot solve.

Mothers' choice of method: All mothers were asked at the first interview about the feeding method they chose before or at delivery and the reason (Tables 4 and 6). All HIV-negative mothers said they chose breastfeeding as did most HIV-positive mothers.

While all HIV-negative mothers chose breastfeeding, they differed substantially for their reasons for doing so between study groups: All these intervention mothers thought breastfeeding was normal or best for the baby with another advantage (e.g., best for baby and affordable). However 70% (7 of 10) of these comparison mothers said the counselor said it was best for the baby. This suggests that the comparison mothers tended to do what the counselors said, whereas the intervention mothers were influenced by numerous factors: the counselor's advice, the brochures, family and community members, and affordability. Intervention mothers often mentioned the brochure as a source of information and sometimes said that they received encouragement from their husbands, mothers, or mothers-in-law to follow the brochure's recommendations.

Four HIV-positive intervention mothers chose replacement feeding, three to protect the baby and one because it was recommended (Table 6).

> *I shared it [the formula brochure] only with my mother as I don't want some other people to know that I'm not breastfeeding the baby. I even lied to the father that I don't have enough breast milk for the baby because of the operation.*
>
> (HIV-positive, replacement-feeding mother)

> *It's only my husband who knows that I'm giving formula to the baby, and he's the only one who has seen that brochure. Even the house girl thinks I'm breastfeeding the baby. My husband said that the brochure has very useful information, and it is a good guide for parents.* (HIV-positive, replacement-feeding mother)

Table 6: Mothers' Reports on Feeding Method and Reason Chosen: First Interview

Method and Reason	Intervention Group (n=30)		Comparison Group (n=29)		Total (n=59)
	HIV-negative (n=10)	HIV-positive (n=20)	HIV-negative (n=10)	HIV-positive (n=19)	
Breastfeeding					
To hide HIV status	-	8	-	3	11
Could not afford replacement milk	-	4	-	6	10
Hide HIV and not affordable		4		1	5
Breastfeeding is normal, easiest	3	-	1	5	9
Best for baby's health, growth, etc.	2	-	2		4
Best for baby and easiest	3	-	-	-	3
Best for baby and affordable	2				2
Counselor recommended as best for baby	-	-	7	3	10
Total choosing breastfeeding	10	16	10	18	54
Infant formula					
Protect baby from HIV infection	-	3	-	-	3
Counselor recommended as best for baby	-	1	-	-	1
Total choosing infant formula	-	4	-	-	4
Cow milk					
Protect baby and cheaper than formula	-	-	-	1	1
Total choosing cow milk	-	-	-	1	1
Total	10	20	10	19	59

Consistency of IFM practice over time: We wanted to know whether these mothers, all in resource-poor settings, could achieve their infant-feeding intent and whether intervention mothers did better in achieving their intent than comparison mothers. The first interview collected each mother's recall of her intended choice, her initial method (soon after birth), and her method at the time of that interview; the second interview collected some mothers' reported method at the time. Thus we obtained reported IFM practice at three points in time for some mothers and four for others (Table 7). Unfortunately, the comparison babies in the second interview sub-sample were substantially older than their counterparts in the intervention group. (See discussion below.) The second interview took place when the intervention babies were on average 2.6 months old and the comparison babies 10.7 months (Table 1). Because of this age difference and because the comparison babies were so few at the second interview, the second interview data on comparison babies was excluded from the analysis of IFM consistency over time.

Table 7 presents mothers' reports of the feeding method changes over time. Specifically, it shows the number of mothers who followed each of the eight possible method patterns from intent to initial feeding to method at first interview for the 59 mothers in the first interview sample, and for the 13 (intervention) mothers in the second interview, it shows method in use at that time. Most intervention mothers were consistent at all three points and at four points where applicable. Four intervention mothers reported using formula (or formula plus cow milk) as their method for the first three stages, and 23 intervention mothers reported exclusive breastfeeding for all three stages. Five mothers said their babies were given formula in the hospital shortly after birth due to surgery or illness, but they returned to exclusive

breastfeeding as planned shortly thereafter and continued to breastfeed until at least the first interview. (Hospital initiation of formula is discussed below.) Including these five, 28 of 30 (93%) of the intervention mothers were consistent across the three stages. Only two intervention mothers started with one method of her own volition and switched to another. Likewise, 12 of the 13 intervention mothers maintained the same method from intent to the second interview. Such consistency was not found in the comparison mothers. At the first interview, 17 of 26 (65%) on whom we have information changed from breastfeeding to mixed or cow milk, and 9 of 25 (35%) said they maintained exclusive breastfeeding. We conclude that, in the intervention group, consistency was much greater and mixed feeding under six months was lower.

Table 7: Mothers' Reports on Feeding Method Patterns: First and Second Interviews

Intended Method→Initial Feeding→Method at First Interview→Method at Second Interview	First Interview				Second Interview	
	Intervention Group (n=30)		Comparison Group (n=29)		Intervention Group (n=13)	
	HIV-neg (n=10)	HIV-pos (n=20)	HIV-neg (n=10)	HIV-pos (n=19)	HIV-neg (n=5)	HIV-pos (n=8)
Formula → Formula → Formula→ Formula	0	3	0	0	0	3
Formula → Formula → Cow/Formula→Cow/ Formula	0	1	0	0	0	1
EBF → EBF → EBF→ EBF	6	13	5	4	2	3
EBF → Formula → EBF[1]→ EBF	3	2	0	0	2	0
EBF → BF+water → BF+water→ EBF	0	1[2]	0	1	0	1
EBF → EBF → Mixed→ Cow	1	0	5	0	1[3]	0
EBF → EBF → Cow -	0	0	0	10[3]	0	0
Cow → EBF → Mixed -	0	0	0	1	0	0
No information	0	0	0	3	0	0
Total	10	20	10	19	5	8

Notes: 1. The BF→Formula→BF pattern reported by 5 mothers in the first interview reflects surgery or illness just after birth, when the hospital gave the baby formula as the initial feed; the mother returned to EBF soon after. 2. The one case in the intervention group with the EBF→BF+water→BF+water pattern reflects water during illness and a reported return to EBF by the second interview. 3. Some or all of these reports of exclusive cow milk feeding may have been mixed feeding.

Five intervention infants (and no comparison infants) received formula shortly after birth from the health facility. In all these cases the mother had a C-section or some problem during delivery. In two of these cases the mother had intended to breastfeed and in fact reported returning to EBF as soon as possible; the other cases were mothers who said they intended to replacement feed.

Change in intended duration of EBF of breastfeeding intervention mothers: At the second interview, we asked the eight mothers who were still breastfeeding (of 13 intervention mothers interviewed) how long they intended to EBF. We compared this duration to the answers these mothers gave to the same question at the first interview. Due to the large age difference between the intervention and comparison babies at the second interview, it is not meaningful to compare mothers' intended EBF duration at the interview.

Three of the eight intervention mothers extended the length of time they expected to EBF by a month or two, and three who said six months at the first interview also said six at the second. Two who said six months at the first interview were uncertain at the second. No one shortened her intended duration (Table

8). This is a very small, inconclusive data set, but it suggests that an additional month or so of feeding experience does not cause mothers to shorten or lengthen their intended EBF duration beyond six months. It may also suggest that giving the mother a brochure promoting EBF for six months may continue to have a positive (although limited) influence on her, despite the absence of direct follow-up.

Table 8: Intervention Mothers' Reports on Intended EBF Duration: First and Second Interviews

HIV status	Mother ID	Intended Duration at 1st Interview	Intended Duration at 2nd Interview	Change in Duration
HIV-positive	1	1–3 months	4 months	Extended
	18	6 months	6 months	Same
	29	4 months	6 months	Extended
	32	6 months	6 months	Same
HIV-negative	3	6 months	Uncertain	Uncertain
	9	4 months	6 months	Extended
	11	6 months	6 months	Same
	12	6 months	Uncertain	Uncertain

When I tell my friends that babies can breastfeed for six months without any other foods or fluids, they say it is not possible because the babies will not grow well. Because they don't believe me, I usually give them the brochure to read for themselves.

HIV-negative, breastfeeding mother

Some of my friends, when they come to visit, have commented that the information [in the brochure] should be given to all mothers who are still breastfeeding because most of the mothers were previously advised to breastfeed for only two to three months.

HIV-positive, breastfeeding mother

Mother's knowledge and reported practice related to MTCT: Regardless of HIV status, nearly all mothers in both groups could articulate at the second interview one or more methods for preventing MTCT. All eight HIV-positive intervention mothers reported using two or three methods, whereas only one (of four) HIV-positive comparison mothers reported using any prevention method (Table 9). While articulated knowledge was about equal in both groups, these data can only suggest, since the second interview was held with so few mothers, that intervention mothers complied with the guidelines more. Most mothers (73%; Table 3) reported at the first interview that their counselors had advised on the importance of safe sex. This is roughly consistent with the data in Table 9 and suggests that the counseling in the intervention group may have made a more lasting impression than that in the comparison group.

Of the five HIV-negative intervention mothers having a second interview, only two (40%) said they were participating in safer sex or being sexually monogamous in order to limit the risk of infection. This percentage is not considered low: Cultural expectations hold that women refrain from sexual intercourse for at least three months after delivery, and for women who do so, it would not likely be considered a safe sex practice, since it is the norm.

V. DISCUSSION

This study developed and then evaluated an integrated program of job aids, take-home materials, and provider training aimed at improving infant-feeding counseling in PMTCT programs in Tanzania. The program's components were based on the latest WHO guidelines for infant feeding by HIV-positive and HIV-negative mothers and on formative research in the pilot study area.

Table 9: Mothers' Reports on PMTCT Understanding and Practice: Second Interview

Topic	Intervention Group (n=13)		Comparison Group (n=7)		Total (n=20)
	HIV-negative (n=5)	HIV-positive (n=8)	HIV-negative (n=3)	HIV-positive (n=4)	
Number (%) who articulated knowledge of methods to prevent MTCT					
- Articulated 2 or more methods	4 (80%)	7 (88%)	0	1 (25%)	12 (60%)
- Articulated 1 or more methods	5 (100%)	8 (100%)	2 (67%)	3 (75%)	18 (90%)
Number (%) who used methods to prevent MTCT					
- Used 2 or more methods	0	8 (100%)	0	0	8 (40%)
- Used 1 or more methods	2 (40%)	8 (100%)	2 (67%)	1 (25%)	13 (65%)
Number (%) who reported inability to use condoms					
	0	0	1 (33%)	2 (50%)	3 (15%)
Number (%) who reported using no protection in sexual intercourse					
	2 (40%)	0	0	1 (25%)	3 (15%)

Generally, our objective was to improve PMTCT counseling and the infant-feeding knowledge and practices of HIV-positive and HIV-negative mothers. Data were obtained from home visits with samples of mothers who had been counseled at intervention and comparison PMTCT sites. Data analysis indicates that the program increased knowledge and practice and that the intervention counseling was superior to the comparison counseling.

A. Findings

We found that the job aids were universally used by the intervention counselors: Over 90% of the intervention mothers referred to and could produce the take-home materials. The mothers understood the language, appreciated the quality of illustrations, often kept them in a safe place, and shared the take-home brochures with relatives and friends. We conclude that the program was fully implemented and rule out partial implementation as a possible explanation of any findings.

The mothers' reports indicate that the quality of counseling was clearly superior in the intervention group: Nearly all these mothers received feeding demonstrations, while none of the comparison mothers did. Furthermore, most intervention mothers knew about breast care while few comparison mothers did. Intervention mothers' knowledge was far superior to comparison mothers' on two measurements (definition and duration of EBF). However, the two groups' knowledge on two other measurements (best method to feed all infants and best method for infants of HIV-positive mothers) was about equal, as were the results of counseling advice on safe sex and no mixed feeding.

While mothers' knowledge was clearly superior in the intervention group, the mothers' practice was not so clear cut. The consistency of feeding patterns from intent through the home interviews and avoidance of mixed feeding are examples. Although intervention mothers were more consistent than comparison mothers in following their chosen feeding method through the first and second interviews, the older age of the comparison infants means the two groups should not be compared on this measurement. Also, the high percentage of HIV-positive mothers who intended to replacement feed but did not do so for very long suggests that they could not meet the AFASS criteria. This was true of a slightly higher percentage of intervention mothers than comparison mothers, which could be explained in several ways, including inadequacies of the intervention or more fundamental problems with meeting AFASS recommendations (further discussion below).

The four intervention counselors agreed during the follow-up discussion that having the job aids and being trained in reviewing their content with mothers enabled and encouraged them to follow a logical,

sequential flow of the key messages. Use of job aids during counseling has been shown in other studies to reduce the need to memorize and probably the possibility of forgetting or skipping information (Moore, 2001a). That work also showed that using job aids increased the probability that the technical information or educational messages given during counseling is standardized and uniform. The value of giving the mother take-home material is heightened by the fact that many women participating in PMTCT programs (perhaps all at KCMC) are routinely counseled on their infant-feeding options on the same day that they receive their HIV test results, when they may be upset and/or confused. KCMC counselors viewed giving mothers an easily understood brochure for later review as critical.

Although the demonstration toolkit was not specifically mentioned by any of the intervention mothers during the interviews, when the four intervention counselors gave feedback at the end of the study, they agreed that having it motivated them to demonstrate preparation of replacement feeds.

B. Limitations

While this study was based on a small sample of counselors and mothers from a single district of Tanzania (four intervention and two comparison counselors, 30 intervention and 29 comparison mothers), the quality of the responses was high. A very experienced interviewer conducted the interviews and was sometimes accompanied by the first author (SL) as a means of validation. The interviews were long and intimate, and home observations confirmed or, rarely, refuted the interview responses. These reasons and the careful, data-driven categorization of responses support our conclusion that the quality of the responses was high and the random variability accordingly low.

The research time frame was short, approximately four months from the training in February 2003 through the final second interview the following June. Such duration precludes conclusions about the long-term impact of the intervention, including infant-feeding practices and health outcomes beyond a few months.

The study had difficulty recruiting HIV-positive women from the comparison sites (perhaps due in part to fear of stigma), which created two types of limitations.

1. The mothers in the comparison group were not selected randomly from all mothers in the comparison PMTCT programs: They were selected and agreed to participate in part because they had a positive relationship with clinic staff. Mothers lacking such relationship were less likely to participate. We expect that women who had positive relationships with clinic staff probably had a more positive counseling experience than women who declined to participate. The same bias in favor of selecting mothers who had a positive counseling experience was probably also true in the selection of intervention mothers. Such bias would tend to overestimate successful communication by counselors to mothers because those with negative experiences were under-represented in the samples. Since we believe under-representation was greater in comparison mothers, our findings probably underestimate the true difference between the two groups.

2. Recruiting difficulties also resulted in our having comparison infants who were older than intervention infants (nine months versus one at the time of the first interview). Consequently, we could not compare data relating to IMF consistency and avoidance of mixed feeding. Further, the longer recall period of the comparison mothers raises questions about the comparability of the two groups' responses on counseling experience and early practices. How this different recall period would influence these responses is unclear.

Given these limitations, the relevance or broad application of some of our findings in other areas of Tanzania may be questionable. Additional research in this area and further testing of the proposed program is highly recommended.

C. AFASS and Informed Choice

The international guidelines unequivocally recommend informed choice, stating that all HIV-positive mothers should be counseled on the advantages and disadvantages of all infant-feeding options and then, assisted by the counselor, the *mother* should select the best option for her circumstances having examined them in light of the AFASS criteria. The mother should make the final "informed" choice on how to feed her child and be supported in whatever she chooses.

The guidelines also recommend that HIV-positive mothers select replacement feeding *only* if they can meet the AFASS criteria. These criteria are challenging, and it is very difficult for a woman, even with a counselor, to predict whether she will be able to meet the AFASS criteria over time. Mistakes can be lethal. Women who choose to replacement feed and subsequently find that they cannot meet the AFASS criteria can substantially increase their infant's mortality risk. Informed choice is not enough: The mother must be able to implement it and stick to it.

Our data contain two important findings on this issue. First, 20% (4 of 20) of the HIV-positive intervention mothers chose to replacement feed, compared to 5% (1 of 19) of comparison mothers. In this small sample, HIV-positive intervention mothers favored replacement feeding more than the comparison mothers. Second, in both groups many of the mothers reported that the counselors had initially advised them to replacement feed and that they, the mothers, had rejected the advice and decided to breastfeed. RF may not have been the counselor's actual recommendation. She may have advocated replacement feeding as a (devil's advocate) technique to help mothers see the difficulty of meeting the AFASS criteria.

What else might explain the 20%–5% dichotomy? One possibility is that the intervention counselors felt empowered to promote replacement feeding because they now had tools to do so, as opposed to the comparison counselors who were perhaps less confident about promoting replacement feeding. Intervention counselors knew more about the various risks and about AFASS and explained both to the mothers, with the result that more intervention mothers optimistically decided they could meet the AFASS criteria than comparison mothers. In other words, the counselor was trying to provide information on all options to ensure an informed choice, but the mothers interpreted this information as being advised to use a replacement option.

We are concerned that several mothers who chose to breastfeed because they couldn't afford RF or feared discrimination said they felt guilty breastfeeding their baby because it could transmit the HIV virus. Their sense of guilt was expressed both in the answers analyzed for this report and other answers. They expressed no understanding of the risks associated with replacement feeding. Informed choice with AFASS may be an ideal that doesn't work sufficiently in practice and may have the perverse effect of causing more rather than less transmission. Regardless of the explanation, the findings encouraged the development of additional AFASS-related counseling tools and a greater focus on AFASS in the updated and expanded training component of the integrated program.

D. Expression and Heat Treatment

Expression and heat treatment of breast milk, critical to breastfeeding mothers who will be separated from their infants for more than a few hours and for the transition from EBF to RF, was not promoted by intervention or comparison counselors. This finding reveals a tension between this aspect of the guidelines and local culture and recommends research to identify ways to encourage consideration of this method.

E. Cessation of Breastfeeding

Although the updated guidelines recommend cessation of breastfeeding by HIV-positive mothers as soon as AFASS criteria are met, they are unclear on the timing of early cessation, the conditions for ending

breastfeeding without risking the mother's or baby's health, or the baby's nutritional status. Both counselors and mothers requested additional information about when to transition, how to transition, and what to transition to. Many counselors understood the guidelines to mean that all HIV-positive mothers should stop breastfeeding by six months.

F. Formula Given in Hospital

Five intervention mothers reported that their babies received formula in the hospital shortly after birth due to the mothers' surgery or illness. These mothers, two of whom were HIV-positive, returned to exclusive breastfeeding as originally planned shortly thereafter and continued to breastfeed until at least the first interview. This hospital practice is disturbing in light of evidence showing that mixed feeding of any kind may dramatically increase the risk of infection (Iliff et al. 2005). This finding suggests that additional dialogue is needed with local authorities on hospital practices and removing barriers to early breastfeeding.

VI. RECOMMENDATIONS

Expanding the job aids and training package: Based on the initial analysis of our research and positive feedback from local and national stakeholders, USAID in Tanzania committed funds from the President's Emergency Program for AIDS Relief (PEPFAR) to improve and expand the initial job aids, take-home brochures, and training program. Working with local authorities, USAID encouraged a scale-up of the intervention to other regions of the country.

Changes were made to the program subsequent to the research. Improvements in the job aids and take-home brochures included new and altered illustrations; the addition and clarification of key messages; re-editing the Swahili translations; and the addition of new materials, either specifically suggested by the counselors and mothers or suggested by the research findings. The Q&A was expanded, and a flow chart on counseling replaced the MTCT job aid on relative risk. Five new counseling cards were added on: 1) the relative risk of transmission of HIV during pregnancy, delivery, and "normal" breastfeeding; 2) the four locally recommended infant-feeding options for HIV-positive women (exclusive breastfeeding, commercial formula, modified cow milk, and expression and heat treatment of breast milk); 3) an AFASS card, which visually depicts the conditions required for AFASS replacement feeding; 4) a card showing how to position a breastfeeding baby; and 5) a card showing how to hand express breast milk. Two new brochures were developed on maternal nutrition and infant feeding after six months (see Appendix 8).

Changes to the training were also suggested by the research findings, local authorities, and other key stakeholders. An expanded training, including a six-day regional training of trainers (or local infant-feeding resource experts), and a series of four-day trainings of infant-feeding counselors were conducted during the year following the training in three regions of the country. (This training strategy has subsequently expanded to include a whole-facility training approach.) The training curricula that have evolved are still based on the generic WHO HIV and infant-feeding course and focus on the guidelines, improved interpersonal communication and counseling, and the effective use of the counselor job aids and mother take-home brochures.

Expanding the integrated program approach: The integrated program of counseling aids and training developed and tested during this research and subsequently expanded is one among many potential behavior change interventions needed to improve infant feeding in the context of HIV in Tanzania. Complementary programs and materials are also needed to address multiple complex behavior change factors. Supportive supervision of PMTCT counselors, for example, could encourage on-going improvements, on-the-job training, and more consistency in counseling. Mass media, especially radio, could disseminate universal messages. Individualized follow-up infant-feeding counseling, home visits, and mother support groups should be encouraged, regardless of HIV status. (The fact that most of the

women in this study who could not describe protective measures for MTCT were HIV-negative suggests that perhaps HIV-negative women were not given the same priority during counseling.) Programs to promote male involvement and the design and dissemination of materials and supportive messages directed to other influential family members, such as mothers-in-law, have had demonstrable impact in other settings and deserve serious consideration in Tanzania.

Further research: Given these limitations, the relevance or broad application of some of our findings in other areas of Tanzania may be questionable. Additional research, including impact evaluation and further testing of the proposed integrated program is highly recommended.

Expression and heat treatment of breast milk, critical to breastfeeding mothers who will be separated from their infants for more than a few hours and for the transition from EBF to RF, was not actively promoted by intervention or comparison counselors. This finding reveals a tension between this aspect of the guidelines and local culture and recommends research to identify ways to encourage consideration of this method.

VII. CONCLUSION

Our findings contribute to understanding of the experiences of both counselors and mothers related to infant-feeding counseling in the context of HIV; they also demonstrate the need for and value of job aids and training to improve infant feeding. The results suggest that focusing provider training on the effective use of counselor job aids and mother take-home materials will increase counselors' and mothers' knowledge, and may lead to improved infant feeding-related behaviors, safer sex during the breastfeeding period, and possibly improved health outcomes for all mothers and their children. This research underscores the complexity of translating the global recommendations on HIV and infant feeding to the local context and of developing culturally appropriate counseling tools. Issues surrounding informed choice and counselors' ability to evaluate the AFASS criteria of individual mothers require additional thought and consultation on the national and international level. The positive impact of this intervention indicates the need for greater investments in both materials and training by national programs. The limitations of this study, however, argue for expanded, multi-dimensional strategies that systematically address the underlying issues surrounding infant feeding in the context of HIV, including poverty, education and training, self-esteem and confidence, stigma, and discrimination.

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APPENDIX 1: FEEDING OPTIONS FOR INFANTS OF HIV-POSITIVE MOTHERS: INTERNATIONAL GUIDELINES[1]

1. Replacement feeding (RF) for the child aged 0–6 months

- Commercial infant formula
- Home-modified animal milk

(Properly modified fresh animal milk, powdered full-cream and evaporated milks are recommended. Unsuitable replacement feeds include unmodified animal milk, skimmed and sweetened condensed milk, fruit juices, sugar-water and dilute cereal gruels. Mixed feeding—combining breast milk and other foods or liquids—is never recommended.)

2. Exclusive breastfeeding (EBF) for children aged 0-6 months

- Exclusive breastfeeding between 0-6 months
- Early cessation of breastfeeding (occurring over a few days to a few weeks)
- Transition from exclusive breastfeeding to replacement feeding

3. Breast-milk feeding

- Wet-nursing
- Expressing and heat-treating breast milk
- Breast-milk banks

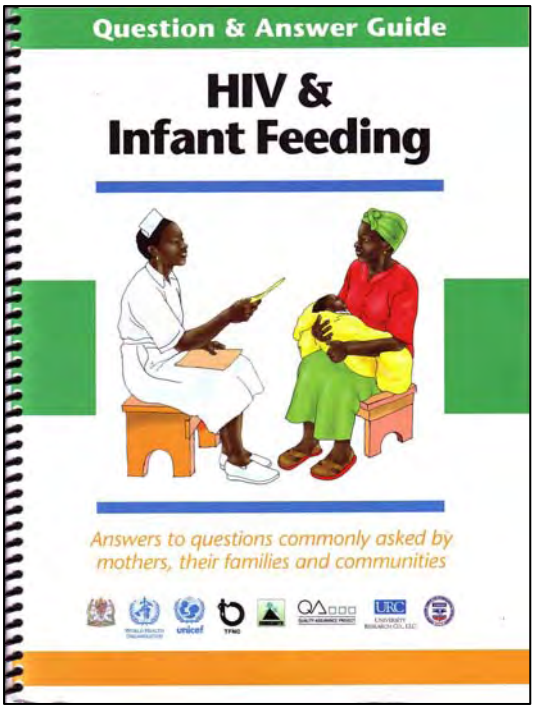
Feeding from six months to two years

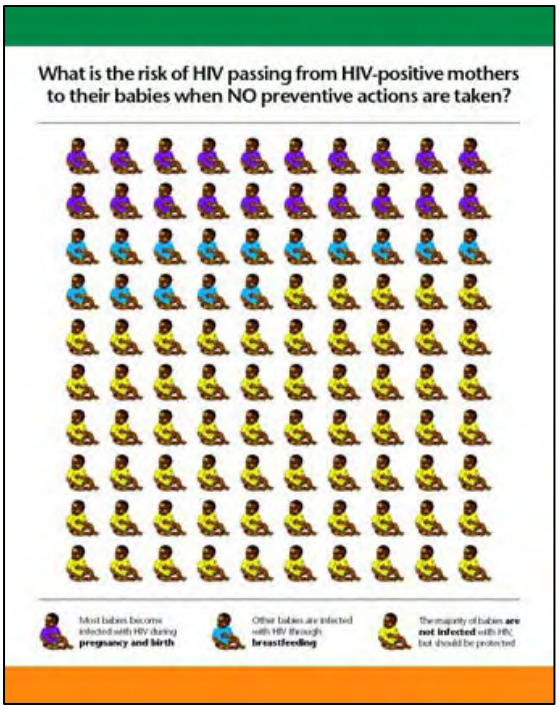
- All children need suitable complementary foods from the age of six months.
- Non-breastfed infants and young children from six months of age should ideally continue to receive a suitable breast-milk substitute as well as complementary foods made from properly prepared and nutrient-enriched family foods.
- When milk is part of the diet, complementary foods are needed 2-3 times a day at 6-8 months of age, and 3-4 times a day from 9 up to 24 months of age, with additional nutritious snacks offered once or twice a day.
- The general principles of complementary feeding are the same for a child receiving a milk source, such as commercial infant formula or animal milk, as for a child being breast-fed.
- Where no suitable breast-milk substitute is available after six months, replacement feeding should be with properly prepared and further enriched family foods given more frequently.
- Other milk products such as boiled animal milk or yoghurt should be included as a source of protein and calcium; other animal products such as eggs, meat, liver and fish should be given as a source of iron and zinc; and fruit and vegetables to provide vitamins, especially vitamins A and C.
- Micro-nutrient supplements are needed, especially iron, according to WHO[2] or national guideline.

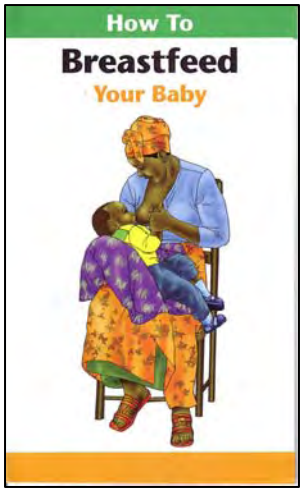
[1] Summary derived from the 2003 revised WHO, UNICEF, UNFPA and UNAIDS. *HIV and Infant Feeding: Guidelines for Decision-makers.* Geneva. 2003.

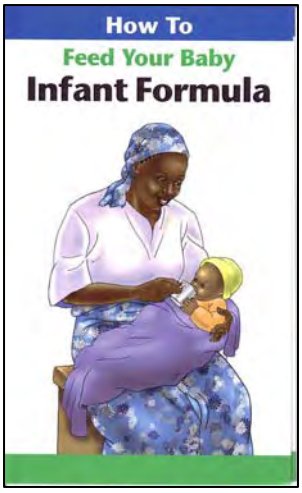
[2] Vitamin A: 50,000IU before 6 months and another 50,000 IU between 6 months and 12 months (with a minimum interval of one month); from 12 months and onward: 2000,000 IU every 4 to 6 months. Iron: where the diet does not include foods fortified with iron or where anaemia prevalence is about 40%, 2mg/kg body weight/day of iron from 6 months of age up to 23 months of age.

APPENDIX 2: HIV AND INFANT-FEEDING JOB AIDS AND COUNSELING MATERIALS USED IN STUDY (ENGLISH)









APPENDIX 3: AGENDA: TRAINING ON HIV AND INFANT-FEEDING COUNSELING

One-Day Program: February 21, 2004

Time	Activity	Responsible Person
08:30 am	**Registration**	
08:40 am	Welcome and introductions exercise (name, previous infant feeding training, and expectations for the day)	Participants
09:05	Review of program and training objectives	Training Facilitator
09:10 am	Background on research project, development of job aids, and objectives of workshop	Training Facilitarors
09:25 am	Q&A - Questions and Answers	Participants
09:30 am	"What do we already know?" exercise	Participants
09:55 am	Short technical update on HIV and infant feeding – new guidance from WHO and UNICEF	Training Facilitators
10:10 am	Q&A - Questions and Answers	Participants
10:15 am	Basics of interpersonal communication and counseling (IPC/C) skills - the role of the counselor (IPC/C brainstorming exercise)	Training Facilitator and Participants
10:40 am	Q&A - Questions and Answers	Participants
10:45 am	**Break - coffee/tea/soft drinks**	
11:00 am	"Getting to know the tools" (small group review of the job aids package, feedback on job aids, and questions and answers exercises)	Participants
01:00 pm	**Lunch**	
02:00 pm	Helping the mother to choose a feeding method (use of job aids)	Training Facilitators and Participants
02:20 pm	Role play exercises on choosing a method	Participants
03:00 pm	Explaining and demonstrating how to implement a feeding method (use of job aids and props)	Training Facilitator and Participants
03:20 pm	Role play exercises on explaining a feeding method	Participants
04:20 pm	Training/orientation feedback and evaluation	Participants
04:30 pm	**"**What have we learned today" exercise	Participants
04:50 pm	**Closing: coffee/tea/soft drinks**	

Training Facilitators: Sebalda Leshabari (Muhimbili University), Peggy Koniz-Booher (URC/QAP), Mary Kibona (Tanzania Food and Nutrition Centre), and Agnes Ngowi (Project Research Assistant).

Participants: KCMC PMTCT Counselors

APPENDIX 4: FIRST INTERVIEW GUIDE

Interview #: _____Visit # _____ Status _____ Date of interview: _____

Time home visit begins: _____ Time home visit ends: _____

Time interview starts: _____ Time interview ends: _____

Place of interview (name of community): _____

Location of interview (outside home, living room, kitchen, etc): _____

Socio-demographic Questions

Age of mother: _____ Marital status of mother: _____

Religion of the mother: _____

Level of education of the mother (number of years completed): _____

Occupation of the mother (if working outside the home): _____

Date of birth of infant: _____ Sex of infant: _____

Where was the infant born: _____

Weight of infant at birth (if known): _____

Anything of note concerning health of the child: _____

_____

Total number of living children: _____ Ages of other children: _____

Total number of people living in the home (compound) in addition to herself: _____

Description of their relationships to the mother (for example: husband/father of infant, siblings, grandmother, grandfather): _____

_____

(NOTE: If the answers to the following questions do not fit in the space provided below, note the number of the question on another sheet of paper and continue the answer.)

General Questions about Counseling Experience and Exposure to Counseling Materials

1. During your pregnancy, how many times, or how often did you go to a counselor at the clinic for testing and/or counseling?
2. Were you ever counseled by one of the counselors at the clinic about feeding your baby? _____ If yes: Can you tell me in your own words what the nurse told you about feeding your baby?
3. Is there anything else the counselor told you about feeding or taking care of your baby? _____ (PROBE if necessary: Is there anything you can do to keep you baby healthy and protect your baby from becoming sick or infected with HIV?)
4. Did the counselor show you any educational or reference materials about feeding your baby? _____ (PROBE: If yes, can you describe the educational or reference materials that she showed you and can you remember if she read them to you?)
5. Did the counselor give you any educational or reference materials to take home? _____ If yes, can you show me what she gave you? (Note: If the mother cannot show you the materials, ask her what happened to them.)
6. Do you remember seeing any other educational or reference materials at the clinic about feeding or taking care of babies? _____ If yes, can you describe those educational materials to me?

General Questions about Chosen Infant-feeding Method (Ask All Mothers)

7. What method of infant feeding do you think is best for most babies in your community and why?
8. What method or methods of infant feeding do you think is/are best for babies of mothers who are HIV-positive and why?
9. What infant feeding method did you choose for your baby and why?
10. Did the counselor tell you what she thought was the best method for you to use? _____ If so, what method did she recommend?
11. Did you tell the counselor what your decision was about how to feed your baby? _____ If yes, what you tell her and what did the nurse say or do when you told her?
12. Did the counselor demonstrate anything to you about how best to feed your baby? ____ (PROBE if necessary, depending on the method: For example, did the nurse show you how to position the baby at the breast, what utensils to use [cup versus bottle], quantities of milk, how to mix or prepare, etc.?)
13. Can you describe in your own words how you fed your baby the day he/she was born and what your experience was?
14. How are you feeding your baby today (method)? _____ (PROBE if the mother indicates that she has changed methods: Can you explain to me when exactly you changed feeding methods, why you have changed feeding methods and what your experience has been so far?)
15. Does anyone else regularly help you feed your baby during the day or night? ____ If yes: Who, when, why?
16. Can you describe to me what you (or others) do each day to feed your baby? (PROBE: Does anything change about the way your feed your baby during the morning, afternoon, evenings or at night?)
17. What would you do if you had to leave the baby unexpectedly for a number of hours with someone else? (PROBE: Ask the mother who she would leave the baby with, and what she would ask them to do if the baby becomes hungry while she is gone.)
18. Is the baby receiving anything other than _____ (say - breast milk, cow's milk or infant formula depending on what method the mother says she is using)? _____ (PROBE if necessary: Any vitamins, water, tea, juice or other liquids? Any foods yet?)
19. If yes, how often has he/she has received this? (PROBE concerning frequency: Do you give this to the baby once a week, once a day, several times a day, only at night, only when you are away from the house?)
20. If yes, how are you giving this (specify liquid or food) to the baby? (PROBE if necessary: What do you use to feed the baby: a cup, bottle, spoon?)
21. In your own words, what does it mean to "exclusively breastfeed" your baby?
22. **(IF MOTHER IS BREASTFEEDING AND SAYS THAT SHE DOES NOT KNOW THE DEFINITION OF "EXCLUSIVE" OR GIVES THE WRONG ANSWER, EXPLAIN TO HER WHAT THE CORRECT DEFINITION IS** – "only giving breast milk to the baby, except for medicines prescribed by a health worker.") Did you start off exclusively breastfeeding your baby?
23. How long do you think a mother who breastfeeds should "exclusively breastfeed" her baby and why?
24. How long do you think most mothers in this community CAN exclusively breastfeed their babies and why? (PROBE to see if the mother thinks it is feasible to exclusively breastfeed past a few weeks or months – how many?)
25. Is there anything a breastfeeding mother can do to help protect her baby from getting HIV? (PROBE to find out what the mother knows about having safe sex, regardless of whether she is HIV-positive or negative and about avoiding mixed feeding if she is HIV-positive.)
26. How long do you plan (or did you) "exclusively _____feed" your baby and why – in days, weeks or months? (ask according to the method used).
27. What will you feed your baby (did you start to feed) when you are no longer giving your baby ONLY _____ milk? (ask according to the method used).

28. ASK ONLY IF MOTHER IS BREASTFEEDING: Did the nurse tell you anything about the importance of breast care and what to do if you had problems with your breasts? ____ (PROBE to find out what advise the nurse gave to the mother.)
29. ASK ONLY IF THE MOTHER IS HIV-POSITIVE: Did the nurse tell you anything about the possibility of expressing and heat treating your breast milk to give to the baby, and if so, what did she tell you and what do you think of this idea?

Specific Questions for Mothers Using Modified Cow's Milk

30. Where do you obtain your cow's milk (and if you have to buy it, about how much do you spend on milk for the baby on a daily basis)?
31. Can you explain to me how often you prepare the cow's milk for your baby and where you store the cow's milk during the day and at night? (PROBE if necessary to clarify if she prepares the cow's milk for use for a whole day and where she stores it.)
32. Can you tell me how much cow's milk your baby drinks everyday?
33. Can you please show me how you prepare cow's milk for your baby? (PROBE if mother does not want to actually prepare the cow's milk at that time: Can you show me the steps you would take and the ingredients you use to prepare cow's milk for your baby? [Demonstration: Note each step that the mother takes or describes.])

Specific Questions for Mothers Using Commercial Infant Formula

34. Where do you obtain your infant formula and how much does it cost per can? (PROBE to specify the size of the can).
35. Can you explain to me how often you prepare the infant formula for your baby? (PROBE if necessary to clarify if the mother makes the formula up for each feed. If she indicates that she makes a larger quantity for all or part of each day or night, ask if she stores it in a thermos or where?)
36. Can you tell me how much infant formula you prepare at a time for your baby and how much he/she will drink everyday?
37. Can you please show me how you prepare infant formula for your baby? (PROBE if mother does not want to actually prepare the infant formula at that time: Can you show me the steps you would take and the ingredients you use to prepare the infant formula for your baby? [Note each step that the mother takes or describes.])

Specific Demonstration Questions for Breastfeeding Mothers

(Note each step that the mother takes or describes.)

38. Can you please show me how you put the baby to the breast? (DESCRIBE in detail how the mother positions the baby, initiates breastfeeding, interacts with the baby, stops breastfeeding.)
39. ASK ONLY IF THE MOTHER IS BREASTFEEDING TO LEARN IF SHE KNOWS ANYTHING ABOUT EXPRESSING HER BREAST MILK AND HEAT TREATING BREAST MILK: Can you please show me how you express breast milk? Can you show me how you would heat treat the breast milk for your baby? (PROBE if mother does not want to actually express and heat treat the breast milk at that time: Can you tell me the steps you would take to express and heat treat breast milk for your baby?)

General Questions about Take-home Brochures

40. Do you have trouble reading the information in the brochures? (PROBE: Is it too much text? Etc.)
41. What do you think of the illustrations – could the mothers in the images be someone from this community? (PROBE: how she would like them corrected)
42. What do you like most about the brochures?
43. What do you like least about the brochures?

Mother's Questions about Infant Feeding (Answer Only at the End of the Survey)

44. Do you have any questions about feeding your baby? (NOTE EACH QUESTION. If the answer is in one of the infant feeding brochures, answer the question and give her that brochure if she does not seem to have a copy. If the mother has a difficult question or problem, encourage the mother to return to the clinic to talk to the nurse.)

Observations

45. Please note (during the home visit or as soon as possible following the home visit) any relevant observations that you make during the actual interview, during the demonstration or while you are visiting in the mother's home. Things of interest include whether or not the mother: has a copy of the brochure or brochures given to her by the nurse; the mother refers to the brochure for guidance without being prompted by the interviewer; has the utensils needed and the ingredients needed to prepare replacement food; says that she is using replacement feeding but breastfeeds child during the interview; says she is exclusively breastfeeding, but you see evidence of bottles or feeding cups used for that baby; seems confused or worried about the instructions that she has been given by the nurse, etc. Please be as complete and specific as possible in your notes.

APPENDIX 5: SECOND INTERVIEW GUIDE

Counseled at _____ (Circle: With brochures / Without brochures)

Date of first interview: _____ First Interview #: _____

Date of follow-up interview: _____ Interview # _____ Status _____

Time home visit begins: _____ Time home visit ends: _____

Place of interview (name of community): _____

Location of interview (outside home, living room, kitchen, etc): _____

Socio-demographic Questions (Use Previous Data, but Confirm with Mother)

Age of mother: _____ Marital status of mother: _____

Religion of the mother: _____

Level of education of the mother (number of years completed): _____

Occupation of the mother (if working outside the home): _____

Date of birth of infant: _____ Sex of infant: _____

Where was the infant born: _____

Weight of infant at birth (if known): _____

Total number of living children: _____ Ages of other children: _____

Total number of people living in the home (compound) in addition to herself: _____

Description of their relationships to the mother (for example: husband/father of infant, siblings, grandmother, grandfather): _____

Current health status of the child: Anything of note concerning health of the child:

_____

_____

(NOTE: If the answers to the following questions do not fit in the space provided below, note the number of the question on another sheet of paper and continue the answer.)

General Questions about Chosen Infant-feeding Method (Ask All Mothers)

1. How do you feel about the method that you are using now to feed your baby (Probe to know whether it was her own choice or counselor's choice?) Why do you think so?
2. Does anyone else regularly help you feed your baby during the day or night? If yes: Who, when, why?
3. Can you describe to me what you (or others) do each day to feed your baby? (PROBE: Does anything change about the way you feed your baby during the morning, afternoon, evenings or at night?)
4. Is the baby receiving anything other than milk: (say - breast milk, cow's milk, or infant formula depending on what method the mother says she is using)? (PROBE if necessary: Any vitamins, water, tea, juice or other liquids? Any foods yet?)
5. If yes, how often he/she has received this? (PROBE concerning frequency: Do you give this to the baby once a week, once a day, several times a day, only at night, only when the mother is away from the house?)

6. If yes, how are you giving this (specify liquid or food) to the baby? (PROBE if necessary: What do you use to feed the baby: a cup, bottle, spoon?)
7. What are you doing to protect your baby from getting HIV? (PROBE to find out whether the mother is practicing safe sex, regardless of whether she is HIV-positive or negative and about avoiding mixed feeding if she is HIV-positive.)

ASK ONLY IF MOTHER IS BREASTFEEDING:

8. How long do you intend to exclusively breastfeed your baby?
9. Do you have any problems with your breasts? (If yes, probe into how she is treating the problem.)

Specific Questions for Mothers Using Modified Cow's Milk

10. Can you explain to me how often you prepare the cow's milk for your baby and where you store the cow's milk during the day and at night? (PROBE if necessary to clarify if she prepares the cow's milk for use for a whole day and where she stores it.)
11. How long do you intend to feed your baby only cow's milk?
12. Can you please show me how you prepare cow's milk for your baby? (PROBE if mother does not want to actually prepare the cow's milk at that time: Can you show me the steps you would take and the ingredients you use to prepare cow's milk for your baby?)
    (Demonstration: Note each step that the mother takes or describes.)

Specific Questions for Mothers Using Commercial Infant Formula

13. Can you explain to me how often you prepare the infant formula for your baby? (PROBE if necessary to clarify if the mother makes the formula up for each feed. If she indicates that she makes a larger quantity for all or part of each day or night, ask if she stores it in a thermos or where?)
14. Can you tell me how much infant formula you prepare at a time for your baby and how much he/she will drink everyday?
15. How long do you intend to feed your baby formula only?
16. Can you please show me how you prepare infant formula for your baby? (PROBE if mother does not want to actually prepare the infant formula at that time: Can you show me the steps you would take and the ingredients you use to prepare the infant formula for your baby? Note each step the mother takes or describes.)

Specific Demonstration Questions for Breastfeeding Mothers

(Note each step that the mother takes or describes)

17. Can you please show me how you put the baby to the breast? (DESCRIBE in detail how the mother positions the baby, initiates breastfeeding, interacts with the baby, stops breastfeeding.)

General Questions about Take-home Brochures

18. Do you still use the brochure(s)? (Probe to clarify when and why is she using the brochures.)
19. Have you shared the brochure with anyone else? If yes, probe to clarify who, and what were the reactions of this person(s) towards the material.
20. Do you need or would like to request an additional material to help you with a transition to another feeding method? (Probe to clarify her specific request, e.g., formula to cow's milk: Why? breastfeeding to cow's milk: Why?)

Mother's Questions about Infant Feeding (Answer Only at the End of the Survey)

21. Do you have any questions about feeding your baby? (NOTE EACH QUESTION. If the answer is in one of the infant feeding brochures, answer the question and give her that brochure if she does not

seem to have a copy. If the mother has a difficult question or problem, encourage the mother to return to the clinic to talk to the counselor.)

22. What are your major problem(s)/ concern(s) for the time being? What are your future plans?
23. Would you like someone to continue visiting you? (Probe to know why and write in details.)

Observations

Please note (during the home visit or as soon as possible following the home visit) any relevant observations that you make during the actual interview, during the demonstration or while you are visiting in the mother's home. Things of interest include whether or not the mother: has a copy of the brochure or brochures given to her by the counselor; the mother refers to the brochure for guidance without being prompted by the interviewer; has the utensils needed and the ingredients needed to prepare replacement food; says that she is using replacement feeding but breastfeeds child during the interview; says she is exclusively breastfeeding, but you see evidence of bottles or feeding cups used for that baby; seems confused or worried about the instructions that she has been given by the nurse, etc. Please be as complete and specific as possible in your notes.

APPENDIX 6: RESEARCH QUESTIONS USED FOR THIS REPORT

Impact of Job Aids and Training of Counselors on Infant Feeding-related Counseling

1. **What is the general context in which counseling is taking place?**

   Initial Interview Questions # 1, 2, 12

2. **Were educational materials (job aids/take-home brochures) actually used in counseling the mothers and were any materials given to mothers to take home?**

   Initial Interview Questions # 4, 5, 6

3. **How was the infant-feeding choice made, was it prescriptive, or suggested by the counselor or was it an informed choice?**

   Initial Interview Questions # 7, 8, 10, 11

   Follow-up Question New #1

4. **Did counselors who received training and used job aids perform better than those who did not?**

   Initial Interview Questions # 3, 28, 29

Impact of Job Aids Related to Infant Feeding on Mothers' Knowledge, Attitude, and Practice

5. **Were the educational materials (job aids/take-home brochures) thought to be useful, acceptable, valued, etc. by the mothers?**

   Initial Interview Questions # 40, 41, 42, 43

6. **Was there any improvement in the general knowledge related to infant-feeding methods and/or mother-to-child transmission of the mothers?**

   Initial Interview Questions # 21, 23, 24, 25

7. **Was there any improvement in the general practices by the mothers related to infant feeding?**

   Initial Interview Questions # 9, 13, 14, 15, 16, 17, 18, 19, 20, 22, 26, 27, 38, 31, 39,
   Follow-up Interview Questions # 2, 3, 4, 5, 6, 17, 10+, 9 (new), 11 (new), 8 (new) 19 (new), 20 (new)

   Subcategory of Practice: Compile Instead of Code Cow's Milk (Very Few Mothers)

   Initial Interview Questions # 30, 31, 32, 33

   Subcategory of Practice: Compile Instead of Code: Infant Formula (Very Few Mothers)

   Initial Interview Questions # 34, 35, 36, 37
   Follow-up Questions # 13, 14, 15, 16

   Compilation Qualitative

   Initial and Follow-up Questions # 31, 33, 44, 45
   Follow-up Questions # 10 + code, 12, 21, 24

APPENDIX 7: TABLES A-1 AND A-2

Table A-1: Mothers' Reasons for Their Opinions on Best Feeding Method: First Interview

Reasons	Intervention Group		Comparison Group		Total (n=59)
	HIV-negative (n=10)	HIV-positive (n=20)	HIV-negative (n=10)	HIV-positive (n=19)	
Babies in their community (No mothers thought replacement feeding was the best method for babies in their community)					
Why breastfeeding is the best method in their community					
Best for baby	5	10	9	15	39
Affordable/available	4	5	1	3	13
Best and affordable	1	4	0	1	6
Avoids HIV infection	-	1	-	-	1
Hides HIV status	-	-	-	-	-
Counselor advised	-	-	-	-	-
Total	10	20	10	19	59
Babies of HIV-positive mothers					
Why breastfeeding is the best method for babies of HIV-positive mothers					
Best for baby	1	-	-	-	1
Affordable/available	-	1	-	-	1
Best and affordable	-	-	-	-	0
Avoids HIV infection	-	-	-	-	0
Hides HIV status	-	1	-	-	1
Counselor advised	-	-	-	1	1
Total	1	2	0	1	4
Why replacement feeding is the best method babies of HIV-positive mothers					
Best for baby	-	-	-	-	0
Affordable/available	1	-	-	-	1
Best and affordable	-	-	-	-	0
Avoids HIV infection	5	18	5	14	42
Hides HIV status	-	-	-	-	0
Counselor advised	-	-	-	1	1
Not recorded	1	-	1	1	3
Total	7	18	6	16	47
Number of mothers who said they didn't know the best method for babies of HIV-positive mothers					
Total	2	0	4	3	9

Table A-2: Mothers' Reasons for Their Opinions on Duration of Exclusive Breastfeeding: First Interview

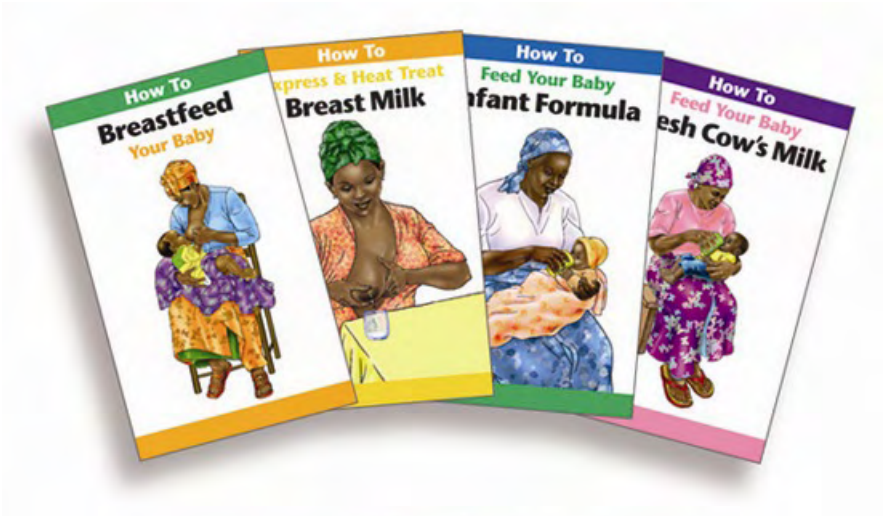
Reason*	Intervention Group (Duration in Months)					Comparison Group (Duration in Months)				
	1–2	3	4	5	6	1–2	3	4	5	6
Why mothers said they *should* exclusively breastfeed this long but no longer										
Mother's milk insufficient after this time			-		-	-	2	-	-	
Counselor's advice	-	-	-	-	8	-	4	5	1	2
Baby ready for other foods	-	-	1	-	11	-	3	6	-	-
Bad for mother's health	-	1	-	-	-	-	-	1	-	-
Mother cannot stay home after this time	-	1	-	-	-	-	-	-	-	-
Other **	-	1	-	-	6	-	2	-	-	-
Don't know or missing data	-	1	-	-	-	-	2	1	-	-
Total	0	4	1	0	25	0	13	13	1	2
Why mothers said women *can* exclusively breastfeed this long but no longer										
Mother's milk insufficient after this time	5	4	1	-	1	5	6	1	-	-
Counselor's advice	-	-	-	-	-	-	-	-	-	-
Baby ready for other foods	-	-	-	-	-	-	-	-	-	-
Bad for mother's health	3	-	-	-	-	4	2	-	-	-
Mother cannot stay home after this time	-	7	-	-	-	2	2	-	-	-
Other **	1	8	-	-	-	1	4	1	-	-
Don't know or missing data	-	-	-	-	-	1	-	-	-	-
Total	9	19	1	0	1	13	14	2	0	0

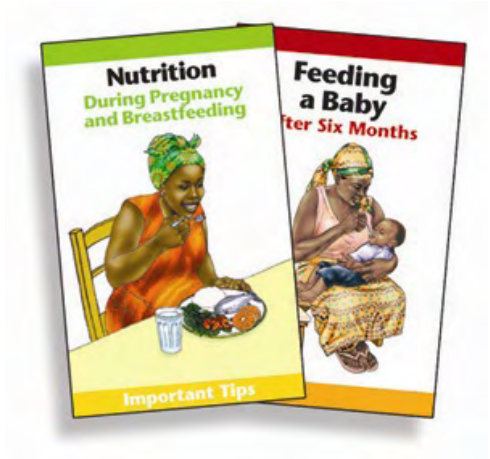
* Single most important reason.

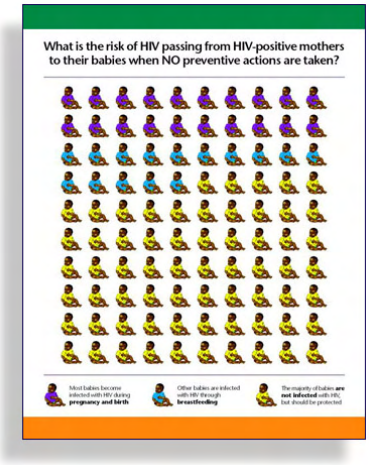
** "Other" includes: normal duration of exclusive breastbeeding, best for baby, combination of reasons, and other.

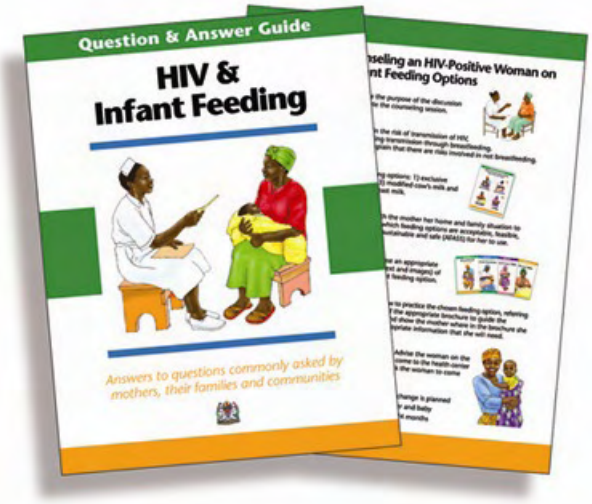
APPENDIX 8: HIV AND INFANT-FEEDING COUNSELING MATERIALS DEVELOPED AFTER STUDY (ENGLISH)

These job aids and take-home brochures reflect changes made based on research reported here.









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